

- 4 For HF Ballasts keep the hot wires from the ballast as short as possible. (If the hot wires are not already marked, these wires will usually be the ones that are short already.)
  - To keep these wires short it will usually be preferable to position the emergency module so as the module 8 way terminal block is in close proximity to the emergency lampholder, or, with a linear lamp, in close proximity to one of the emergency lamp holders.
  - If a remote conversion is to be used then place the remote 10 way terminal block (8 inverter connections plus 2 LED connections) in close proximity to the emergency lampholder. The loom connections to this block should be kept as short as possible both inside and outside the fitting.
  - The electronic ballast to be used with the emergency lamp should be placed so as the lamp connection terminals are near to the 8 (or 10) way terminal block. With this layout the 'hot' wires can be routed directly to the module terminals 7 & 8, and then from terminals 1 & 2 to the nearest lampholder
- 5 Place the batteries where they won't get too hot.
  - Avoid placing the batteries too close to the lamps especially the cathodes, or the ballast.
  - The battery wiring will have negligible effects on the EMC.
  - **Do not connect the batteries until the unswitched 240V supply is permanently assured.**
- 6 Using the Standard Wiring Circuits, where shown, convert the luminaire wiring with reference to the original circuit and routing, and where possible the original ballast manufacturer's instructions.
  - On HF Ballast conversions the switched supply to the ballast should be routed via the Lin/Lout pair on the module so as to always prevent the ballast shutting down if the unswitched supply only has failed.
  - Avoid large loops in the wiring
  - It may be necessary to fit additional cable clips or heat shields to protect the wiring from thermal damage, and minimise electromagnetic disruption.
  - For other circuits not shown please consult the Technical Department.
- 7 The LED indicator should be positioned for immediate visual identification without removal of diffuser or louvre.
  - The LED wiring will have negligible effect on the EMC compatibility.
  - Physically position the LED nearest the Emergency Lighting lamp to indicate function.
- 8 Once the Unswitched 240V supply is permanently assured, connect the batteries.
  - **Once the batteries are connected ensure the unswitched mains power is not being turned off every night** or else the batteries will not charge correctly to give the required duration and lamp degradation will occur.
  - Ensure that the lamp is fitted.
  - Sign and Date the commissioning label to show when battery was installed.
- 9 Where practical use new wiring for all interconnection, and avoid connectors to existing wiring.
- 10 On completion of the conversion, check all connections and wiring, ensuring Earth Continuity and conductor integrity. Do not use High Voltage Insulation Test Equipment.
- 11 The Unswitched 240V supply to the luminaire should be clearly identified.
- 12 With the supplies and batteries connected, check the LED indicator illuminates, and the lamp(s) illuminate at full brightness, and with the unswitched supply failed, check that the lamp illuminates at reduced brightness.

Please allow 24 hours charging before full operation/duration is achieved.

### Conversion wiring for fittings with Conventional Ballast

When modifying a conventionally ballasted mains luminaire to accept an emergency conversion, it will usually be necessary to rearrange the wiring and component layout of the fitting to obtain the best thermal performance whilst still paying due attention to the electromagnetic, and safety criteria. Although the mains supply to the conventional ballast is at a low frequency (LF), typically 50 Hz, and the output leads from the ballast to the lamp are also at a low frequency, the inverter output leads [terminals 1-4] run at high frequency (HF) when the module is in an emergency situation. The wires and looms carrying the LF connections should be kept away from the HF ones to improve the EMC. Fit the inverter module and battery in an accessible position within the luminaire, ensuring that they are as far away as possible from the high temperature control gear (ie ballast etc.). If necessary reposition the ballast to keep the battery and module as cool as possible. It is not necessary to use the Lin/Lout pair with conventional ballast. Follow wiring instructions as from 1 above.



## Installation Instructions for LLS Module Range

### Introduction

The Liteplan LLS range of Emergency Lighting Conversion modules are all equipped with a high quality mains control circuit, inverter circuit, 4 pole changeover relay and an additional 1 pole relay. This single pole relay allows the incorporation of the modules with all Electronic (HF) Ballasts and Switch-Start Control Gear and 4 pin lamps to provide Maintained Emergency Lighting. The 4 pole relay enables the emergency lamp to be run from the mains gear by providing a straight through connection at the eight way module terminal block when the unswitched supply is healthy. The 1 pole relay has a time delay which prevents the HF ballasts from 'shutting down' by breaking the switched supply to the ballast. One side of the lamp cathodes are connected to terminals 1&2, and the other side to terminals 3&4. The mains ballast connections are made to terminals 5-8, (see typical wiring diagrams for details overleaf). Under mains healthy input, terminal 8 links to 1, 7 to 2, 6 to 3 and 5 to 4, then upon unswitched mains failure, the inverter circuit powers the lamp from the battery. A LED indicator is provided to show battery charge healthy, and it also is used to indicate an emergency lamp/fitting.

### Conversion wiring for fittings with HF Ballast

When modifying a mains luminaire to accept an emergency conversion which is fitted with one or more electronic ballasts, it will usually be necessary to rearrange the wiring and component layout of the fitting to obtain the best electromagnetic performance whilst still paying due attention to thermal and safety criteria. Electronic ballasts are distinct from conventional ones in that the ballasts work at a higher frequency. The mains supply to the Electronic ballast is at a low frequency (LF), typically 50 Hz, and the output leads from the electronic ballast to the lamp are at a high frequency (HF), typically 10-100 kHz. The inverter output leads (terminals 1-4) also run at high frequency when the module is in an emergency situation, therefore the wires and looms carrying the LF connections should be kept away from the HF ones to improve the EMC. Conversion should be carried out taking into account the following points:

- 1 If possible the luminaire should be converted integrally, but if this is not possible a remote conversion can be used, keeping the interconnecting looms kept as short as possible and the LF connections separate from the HF ones.
  - Do not use a common loom for the high frequency (HF) connections and the normal 240V supply (LF).
  - Ensure that the Lin/Lout connection pair (LF) are routed away from the high frequency connections. Keep the looms segregated, do not cable tie the looms together.
  - For Liteplan's standard remote looms the colour code is as follows: 1 White; 2 Violet; 3 Grey; 4 Blue; 5 Yellow; 6 Red; 7 Black; 8 Pink; Lin Brown; Lout Orange.
- 2 Ensure any fixings are carried out in a similar fashion to those employed by the original luminaire manufacturer and that the cables used have the same specification (minimum 105°C rated PVC)
- 3 Segregate the mains (LF) wiring, and inverter output [terminals 1-4] (HF) wiring, by separately routing the cables in order to minimise Electromagnetic interference between the two.
  - Within the fitting this can easily be done by routing the HF connections one side of the Lighting components (Ballast, Emergency Module etc.) and the LF connections the other side.
  - The switched 240V supply to the electronic ballast needs to be kept as short as possible inside the fitting.
  - The Unswitched 240V supply to the Emergency module needs to be kept short but it is better to lengthen this connection than the switched one.
  - If it is necessary to cross the HF and LF connections then this should be done at right angles in order to minimise interference.
  - It will usually be acceptable to run the LF and HF connections in close proximity for a **short** distance if this cannot be avoided.

# LLS Typical Wiring Diagrams

